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CHAPTER 9

POSTTRAUMATIC STRESS DISORDER

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INTRODUCTION

Characteristics of the Disorder

Posttraumatic stress disorder (PTSD) is uniquely characterized by the intense reliving of a life threatening, traumatic event. This reexperiencing occurs through intrusive thoughts, nightmares, and/or flashbacks and is accompanied by psychological numbing and avoidance, and by symptoms indicative of hyperarousal or physiological dysregulation. PTSD may be observed following one of a host of extremely stressful life experiences, and is often psychologically and vocationally debilitating. It is also one of the few disorders currently in the diagnostic nomenclature (American Psychiatric Association, 1994) that includes the presumed etiology as one of the diagnostic criteria. As we shall see later, the need to identify a causal experience presents numerous challenges to both clinicians and researchers who work with traumatized populations.

PTSD has been the subject of considerable empir-

ical study since its inclusion in the DSM-III in 1980. Much of the initial research related to the diagnosis was supported by the Department of Veterans Affairs to examine the adjustment of veterans who served in Vietnam and other war zones. Subsequent studies have expanded the focus and described PTSD as a consequence of rape, natural disaster, technological disaster, motor vehicle accidents, torture, and criminal victimization, among other events.

Symptomatology

The preeminent symptoms that are observed when evaluating a patient with PTSD are anxiety and depression. For this reason, traumatized patients often have been misdiagnosed, and this continues to be a risk unless an appropriate evaluation of potentially traumatic experiences is included in the assessment.

Apart from anxiety and depression, patients with PTSD report core symptoms that are assigned to three clusters: (1) reexperiencing of the traumatic event in

TABLE 9-1 Diagnostic criteria for posttraumatic stress disorder.

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- A. The person has been exposed to a traumatic event in which both of the following were present:
- (1) The person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others.
 - (2) The person's response involved intense fear, helplessness, or horror. In children this may be expressed instead by disorganized or agitated behavior.
- B. The traumatic event is persistently reexperienced in at least one of the following ways:
- (1) Recurrent and intrusive distressing recollections of the event (in young children, repetitive play in which themes or aspects of the trauma are expressed)
 - (2) Recurrent distressing dreams of the event
 - (3) Acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative [flashback] episodes, even those that occur upon awakening or when intoxicated)
 - (4) Intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event
- C. Persistent avoidance of stimuli associated with the trauma or numbing of general responsiveness (not present before the trauma), as indicated by at least three of the following:
- (1) Efforts to avoid thoughts or feelings or conversations associated with the trauma
 - (2) Efforts to avoid activities, places, or people that arouse recollections of the trauma
 - (3) Inability to recall an important aspect of the trauma
 - (4) Markedly diminished interest or participation in significant activities
 - (5) Feeling of detachment or estrangement from others
 - (6) Restricted range of affect, e.g., unable to have loving feelings
 - (7) Sense of a foreshortened future, e.g., does not expect to have a career, marriage, or children, or a normal life span
- D. Persistent symptoms of increased arousal (not present before the trauma), as indicated by at least two of the following:
- (1) Difficulty falling or staying asleep
 - (2) Irritability or outbursts of anger
 - (3) Difficulty concentrating
 - (4) Hypervigilance
 - (5) Exaggerated startle response
- E. Duration of the disturbance (symptoms in B, C, and D) of at least 1 month.

Specify delayed onset if the onset of symptoms was at least 6 months after the trauma

the form of intrusive thoughts, distressing nightmares, physiological arousal, and, possibly, feeling as if the event were occurring again (flashbacks); (2) avoidance of stimuli resembling the traumatic event or cues associated with it, and emotional numbing of responsiveness; and (3) persistent symptoms of excessive arousal, such as disturbed sleep, exaggerated startle, and heightened vigilance. Table 9-1 presents the full list of symptom criteria.

ASSESSMENT METHODS

Multimethod Assessment of PTSD

Assessment instruments for evaluating an individual for a history of exposure to traumatic stressors and for the development of PTSD are numerous (see Wilson & Keane, 1997). This growth in assessment methods has contributed enormously to the burgeoning new knowledge in the field of psychological

trauma. The quality of the instruments generally is very high in terms of demonstrated reliability and validity (Norris & Riad, 1997). The selection of instruments to be employed depends largely on the purpose of the evaluation. The goal of this section is to encourage clinicians and researchers to consider using a multimethod approach in their assessment of PTSD.

A multimethod approach to assessing PTSD was initially developed in an innovative clinical research program for Vietnam veterans with combat-related PTSD at the Jackson, Mississippi, VA Medical Center in the early 1980s (Keane, Fairbank, Caddell, Zimering, & Bender, 1985; Keane & Kaloupek, 1982). It advocated the use of multiple measures for evaluating the presence of PTSD in order to increase the accuracy of the diagnostic process that was so fundamental to the clinical and research missions of the program.

At that time, few measures of PTSD were available, and those that were available were experimental in nature. These clinical researchers reasoned that no single measure of PTSD could ever function as the definitive indicator of PTSD and that there is a need for the use of multiple assessment formats in order to maximize the possibility of appropriately assessing all individuals. For example, some individuals will be more comfortable and forthcoming with a clinically oriented diagnostic interview, some will prefer self-report questionnaires, and still others will be most comfortable with a computer-administered questionnaire. An approach that incorporates all of these formats may be optimal for identifying cases of PTSD. Because of the high rates of trauma exposure and PTSD among women and minorities, such an approach may also address the gender and cultural limitations of psychological assessment for PTSD (Keane, Kaloupek, & Weathers, 1996; Wolfe, Brown, Furey, & Levin, 1993).

Structured Diagnostic Interviews

Perhaps the most frequently employed diagnostic measures are structured diagnostic interviews that derive their content directly from the DSM criteria. There are multiple available interviews and all have excellent psychometric properties. The Clinician Administered PTSD Scale (Blake et al., 1990; Weathers

et al., 1996), developed in the National Center for PTSD–Boston, measures all symptoms of PTSD and its associated features, requiring attention to both the frequency and the intensity of the expressed symptom. Moreover, it explores the impact of the symptomatology on both social and vocational functioning, features that are unavailable in any other assessment instrument. Because of its comprehensiveness, it has become one of the most widely used measures of PTSD both in the clinic and in the research laboratory.

Other instruments developed expressly for the assessment of PTSD include the PTSD Diagnostic Scale by Foa (1997), the Davidson PTSD Interview (Davidson, Smith, & Kudler, 1989), the Structured Clinical Interview for the DSM (First, Spitzer, Gibbon, & Williams, 1997), and the Anxiety Disorders Interview Schedule—Revised (DiNardo & Barlow, 1988). Each has distinct strengths, and the needs of a particular clinic or research study will determine which diagnostic interview is best.

Self-Report Instruments

The field has experienced a proliferation of self-report measures of PTSD over the past 15 years. Included among them are scales and questionnaires that are quite reliable and, when compared to a clinical diagnosis of PTSD, work very effectively in identifying people who have PTSD (i.e., high sensitivity) and people who do not (i.e., high specificity). Some of these scales directly measure the DSM criteria, while others purport to measure the construct of PTSD more broadly. Still others are empirically derived from existing measures of personality such as the Minnesota Multiphasic Personality Inventory–2 (MMPI-2) or symptomatology, such as the 90-item Symptom Checklist–Revised (SCL-90-R).

The PTSD Checklist (Weathers, Litz, Herman, Huska, & Keane, 1993), also developed at the National Center for PTSD–Boston, provides a continuous measure of the 17 symptoms of the diagnostic criteria for PTSD. It has strong psychometric properties and has been validated against clinicians' diagnosis and other known measures of PTSD. A measure with many of the same attributes, developed by Foa and her colleagues, is the PTSD Symptom Scale—Self-Report Version (Foa, Riggs, Dancu,

& Rothbaum, 1993). It, too, has strong psychometric properties.

The PTSD Scale of the MMPI-2 (PK; Keane, Malloy, & Fairbank, 1984) was empirically derived from the full MMPI administered to veterans with and without PTSD. The scale consists of 46 items of the MMPI-2 taken from across the standard clinical scales of the instrument. It was initially validated and cross-validated on war veterans; more recent work on civilian trauma indicates that it is a good measure of PTSD across traumatic events (Koretzky & Peck, 1990). Further, the use of the MMPI-2 in assessments of PTSD capitalizes on the many validity scales contained therein, items of particular importance when forensic issues and compensation are pivotal in the evaluation.

Similarly, Saunders, Arata, and Kilpatrick (1990) developed a crime-related PTSD scale from the SCL-90-R, as did Weathers et al. (1996) for combat-related PTSD. These scales can be especially valuable because existing data sets that contain these measures can be used to address questions regarding posttraumatic symptomatology. Several research projects utilizing these measures are now underway.

The Mississippi Scale for Combat-Related PTSD (Keane, Caddell, & Taylor, 1988) and its civilian counterpart measure broadly the construct of PTSD. When this scale was first developed, DSM-III and III-R criteria were in use clinically. That research group recognized that any scale that strictly measured the DSM criteria would necessarily have a short life as a result of the major advances in the field of trauma. As a result, the group focused on the construct of PTSD broadly so that items selected would provide enduring contribution to the measurement of the disorder, regardless of modifications in the criteria themselves. The strategy was successful in that the Mississippi Scale has been in continuous use for 15 years and has successfully crossed three versions of the diagnosis (Newman, Kaloupek, & Keane, 1996).

Psychophysiology of PTSD

Numerous research studies have documented that individuals with PTSD respond to cues reminiscent of the traumatic event with heightened psychophysiological arousal. An early demonstration of this re-

activity by Malloy, Fairbank, and Keane (1983) involved the presentation of a series of pictures and sounds depicting combat to veterans with combat-related PTSD, combat veterans without PTSD, and non-combat veteran controls diagnosed with other psychiatric conditions. The investigators compared each individual's responding to the combat cues with their responding to an audiovisual series of control cues that were unrelated to combat. Measuring heart rate and skin conductance (a reflection of emotion-triggered sweating), they found that the PTSD veterans showed differentially high rates of physiological arousal to the combat relative to the control cues. This pattern of responding was specific to the PTSD group; neither the well-adjusted combat veterans nor the psychiatric controls showed much physiological responding to either set of cue presentations. Using only auditory combat cues, Blanchard, Kolb, Pallmeyer, and Gerardi (1982) also observed greater heart rate, skin conductance, electromyographic (i.e., muscle tension), and blood pressure responses among Vietnam veterans compared with nonveteran controls. A systematic series of studies by this research group also indicated that heart rate reactivity was a particularly sensitive index of the PTSD diagnosis in over 200 subjects tested.

Similarly, Pitman, Orr, Forgue, deJong, and Claiborn (1987) employed a procedure involving emotional imagery (based on the work of Peter Lang) and found that PTSD patients with combat-related PTSD were more aroused than veterans without PTSD when images of their own stressful combat experiences were presented to them. This physiological arousal to trauma imagery was more directly observable in skin conductance responses, although other response channels showed some differential reactivity as well.

In addition to the heightened psychophysiological reactivity to combat cues found in these studies, PTSD patients have sometimes demonstrated greater physiological arousal during baseline (rest) periods at the beginning of their test session than have comparison groups employed in the studies. Gerardi, Keane, Cahoon, and Klauminzer (1994) also found greater arousal outside the experimental laboratory when they examined the resting heart rate of veterans with and without PTSD in a medical (nonpsychiatric) setting.

It is tempting to interpret these differences at rest as an indication that individuals with PTSD have higher levels of sustained arousal, but such does not appear to be the case. McFall, Veith, and Murburg (1992) demonstrated that the resting heart rate and blood pressure readings for combat veterans with a PTSD diagnosis did not differ from the readings for combat veterans without the diagnosis when care was taken to ensure that the circumstances of testing were not threatening or stressful. Prins, Kaloupek, and Keane (1995) have reviewed the findings associated with baseline readings and concluded that differences between PTSD and non-PTSD groups reflect apprehension on the part of the individuals with PTSD. From this perspective, the psychophysiological differences at rest are comparable to those demonstrated in response to trauma cues, although they are evoked by the *anticipation* of encountering such cues rather than by direct contact with the cues themselves. These anticipatory reactions highlight the potential for fear conditioning to generalize beyond concrete stimuli to abstract mental representations.

This body of research findings suggests that objective psychophysiological hyperreactivity is strongly associated with the diagnosis of PTSD. The strength of this association was tested in a recent, study of over 1200 military veterans (Keane et al., 1998). One aim of the study was to examine the correspondence between the diagnosis of PTSD based on clinical interview and psychophysiological responses measured under several conditions that included rest, presentation of standardized combat pictures and sounds, and presentation of individually determined imagery scenes of combat. The study replicated many of the previously documented differences between PTSD and non-PTSD groups. It also used advanced statistical methods to demonstrate that the diagnostic status of approximately two-thirds of the subjects could be identified correctly on the basis of individual psychophysiological reactivity. This outcome supports the importance of psychophysiological responding as a feature of PTSD, but it also makes it clear that the diagnostic interview and psychophysiological challenge test are measuring different domains that do not fully overlap. However, both provided useful information about the nature of PTSD, and both offer important targets for its assessment and treatment (Keane,

Fairbank, Caddell, & Zimering, 1989; Keane & Kaloupek, 1982).

Finally, although the bulk of evidence regarding psychophysiological response to trauma-related cues has involved combat veterans, recent efforts are addressing other traumatized populations. The work of Blanchard and his colleagues, in particular, has demonstrated the applicability of psychophysiological challenge testing with individuals who have experienced serious motor vehicle accidents (Blanchard et al., 1996; Blanchard, Hickling, Taylor, & Loos, 1994). The studies have thus far demonstrated the expected differences in responding between individuals who qualify for a PTSD diagnosis and those who do not. In addition, Blanchard et al. (1996) found that they could use psychophysiological responding to imagery scenes depicting the individual's accident to predict the diagnostic status for over 75% of those with accident-related PTSD. They administered an imagery procedure within 4 months of the accident and found that those who continued to meet diagnostic criteria for PTSD 1 year later showed greater initial physiological response than those who became less symptomatic over the 1-year period. This preliminary attempt to predict the course of PTSD demonstrates the potential value of psychophysiological challenge testing for both research and clinical applications. Further study will determine whether this potential can be realized.

DIAGNOSTIC ISSUES

To meet diagnostic criteria for PTSD, an individual must first endorse the presence of a traumatic event in which the person experienced, witnessed, or was confronted with an event that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others. The person's response to the event typically involves intense fear, horror, or helplessness. Individuals must report at least one symptom of reexperiencing, three avoidance or numbing symptoms, and two of the hyperarousal symptoms. Both the overarching symptom clusters (i.e., reexperiencing, numbing, and hyperarousal) and the stressor criterion have stimulated considerable debate and controversy in the field. DSM workgroups have focused on these issues with an eye toward resolving the concerns of various

scholars and clinicians. Here we will attempt to outline some of these controversies.

The Stressor Criterion

Among the most frequently debated of the diagnostic issues surrounding PTSD is the inclusion of an identified stressor within the criteria for the disorder. This feature is problematic for several reasons. First, structurally PTSD is one of a very few disorders (adjustment disorder is another) that requires a nonsymptom event as a key feature of the disorder. In creating the DSM-III, great care was exerted by the authors to be atheoretical and phenomenological in orientation toward diagnosis. This meant an emphasis on the observable and, in particular, on the psychological condition of the patient. PTSD is thus at odds with the format used for other psychological disorders. Removing the stressor criterion would at least make PTSD comparable to most other disorders on this dimension. However, some scholars advocate the inclusion of the stressor in order to emphasize the connection of the event to the symptoms.

A second issue that centers on the stressor criterion is definitional. The problem has at least two elements. First, events that are extremely stressful for some are not necessarily devastating for others. For instance, some combat veterans found that their experiences in Vietnam prepared them to lead successful lives (Hendin & Haas, 1984). Was their experience, then, a traumatic one? Presumably, past learning history, biological factors, and personality style must play a role in who appraises an event as traumatic and who develops PTSD. At the opposite end of the spectrum, a woman in our clinic whose entire family had died in a car accident, when she was later involved in a relatively mild accident herself (i.e., cars colliding at 10 mph), developed a dramatic case of PTSD. Clearly, not all people would experience marked distress at a relatively minor car accident; yet it is quite understandable that this woman did develop PTSD because of her past experience with automobile accidents.

Second, there is little evidence to substantiate the assertion that events must be outside the range of usual human experience to cause traumatic symptoms. Breslau and Davis (1987) have provided some data indicating that PTSD symptomatology occurs

following a wide range of common stressors, not simply those that are unusual. Virtually everyone would agree that the imprisonment and slaughter of European Jews by the Nazis or inflicted upon the Cambodians by the Khmer Rouge are traumatic for the survivors. However, there is active debate among researchers and clinicians about whether less dramatic events such as the loss of a job, sexual harassment, an illness, or the natural death of a loved one qualify as traumatic stressors, sufficient to fulfill this criterion for PTSD.

The problems with the stressor criterion, therefore, may be inherently unresolvable unless one adopts a transactional perspective on the development of behavioral disorders. Such a model emphasizes the interaction of both person and environment factors in the development of psychopathology. Other similar models of psychopathology, including the diathesis-stress model and the vulnerability-stress model, all recognize a biological or psychological predisposition on which a significant stressor is superimposed. Theoretically, there is no apparent empirical justification for PTSD to be distinguished from other forms of psychopathology with respect to the primacy and importance of the psychological stressor or the type of stressor that might be responsible for someone developing the disorder. There remains considerable controversy regarding the inclusion of the stressor criterion and its precise definition in the PTSD diagnosis. Future research should provide an empirical foundation for continuing this diagnostic convention. Unfortunately, there are no data that decisively support either the inclusion or exclusion of the stressor criterion at this time.

Symptom Clustering

The three sets of PTSD symptoms include the categories of reexperiencing, numbing/avoidance, and hyperarousal. This classification scheme was derived from a conceptual article by Brett and Ostroff (1985) that described the phenomena associated with psychological trauma from a psychoanalytic standpoint. Borrowing and expanding on Horowitz's (1976) work, this article proposed an opponent-process model of the major symptoms of PTSD, such that the stressful reliving experiences and numbing balance each other while the individual attempts to cope

with or master overwhelming life experiences. This process is characterized by behavioral, physiological, and cognitive components that, over time, result in affective numbing for those who suffer PTSD. Like Horowitz, Brett and Ostroff (1985) felt that there was an oscillating dimension of the reliving and numbing features of the disorder, such that people passed from one phase into another and back. On the basis of this perspective, the DSM-III-R organized the symptoms of PTSD into the reliving and numbing/avoidance categories. In addition, the numerous studies on the psychophysiology of PTSD (e.g., Blanchard et al., 1982; Malloy et al., 1983) helped to identify a third major cluster of arousal symptoms to be included in the diagnostic criteria.

To date, there is substantial empirical support for the clusters of reliving symptomatology and hyperarousal as key features of PTSD (Gleser, Green, & Winget, 1981; Kilpatrick et al., 1985; Shore, Tatum, & Vollmer, 1986). In contrast, there is growing skepticism about the inclusion of the numbing/avoidance criterion at its current high level (three necessary symptoms; Kulka et al., 1988). This skepticism derives from the observation that a major coping strategy employed by some traumatized individuals during the course of their recovery is involvement with many groups and experiences designed to assist in recovery and promote social and psychological change (e.g., Mothers against Drunk Driving; Veterans Service Organizations, Rape Centers). In addition, no precise definition of emotional numbing has as yet appeared in the literature, leading to inconsistent operationalization of this term and hindering systematic research (Litz, 1991). Innovative research on the numbing symptoms associated with trauma would be a significant contribution to our clinical and conceptual knowledge of the disorder.

In addition, several recent studies have found considerable reliving and hyperarousal symptomatology following high-level stressors, but little avoidance or numbing (e.g., Helzer, Robins, & McEvoy, 1987). Consequently, the DSM working group on PTSD is reconsidering the emphasis currently placed on the numbing and avoidance characteristics in arriving at the diagnosis. The primary concern is that many possible cases of PTSD are not being identified because of an overly restrictive set of criteria. Unfortunately, the data are not yet available to determine what the

differences in rates of PTSD might be when diagnostic criteria are modified or when different criteria are used. Although most experts agree that PTSD frequently has a numbing and avoidant component, the universality of this symptom cluster is now being reconsidered in light of both conceptual and empirical work.

Prolonged Stressors

Another concern of researchers and clinicians in the PTSD field is the extent to which the diagnostic criteria are adequate for the identification of people who have survived certain types of prolonged, aversive life experiences. The psychological condition of incest survivors (Herman, 1981) and of women who have been battered or abused by their partners (Koss, Gidycz, & Wisniewski, 1987) emphasizes more of the withdrawal, numbing, and avoidant symptoms associated with PTSD, coupled with low self-esteem, confidence, and feelings of inadequacy. Reliving experiences and flashbacks are less salient among victims of prolonged stress. The applicability of the PTSD diagnosis to these groups is currently being examined (see disorders of extreme stress in the DSM-IV), but to date there is no consensus on the best approach to handling this issue.

Categorization of the Disorder

Currently PTSD is considered an anxiety-related disorder and, accordingly, is placed within the anxiety disorder category in the DSM. Indeed, PTSD shares many common elements with other disorders, including affective disorder, as mentioned earlier, and dissociative disorder. Because one of the diagnostic features of PTSD is psychogenic amnesia, and because the backgrounds of dissociative disorder patients routinely contain childhood, sexual, and physical abuse (Braun, 1987), many have suggested that PTSD should be a variant of the category dissociative disorder. Although there appears to be a fundamental relationship between PTSD and dissociative disorders, the precise nature of this relationship has not been very well delineated. Given that some PTSD patients have dissociative experiences (Brett & Ostroff, 1985), but not all PTSD patients have these experiences (Helzer et al., 1987; Kulka et al., 1988), per-

haps a more accurate strategy would have dissociative disorder classified as a variant of PTSD. Such a proposal will be particularly compelling if the high rates of psychological trauma in the histories of dissociative disorder patients are replicated in additional empirical studies.

At present, PTSD's placement will likely remain within the anxiety disorders. This is appropriate given our current state of knowledge, but also because PTSD has benefited immensely from the sophisticated research methodology that has developed in the anxiety disorders field (Keane, 1989). Presumably, association with other anxiety disorders like panic disorder, obsessive-compulsive disorder, and generalized anxiety disorder will continue to stimulate high-quality research on PTSD. In the future, as more evidence is collected, we can perhaps consider a separate traumatic stress disorder category. Included under this rubric might be all types of disorders that have traumatic etiology (e.g., borderline personality disorder, dissociative disorder, psychogenic amnesia, traumatic phobias, etc.). This emphasis on etiology is not now appropriate given our current state of knowledge, but may ultimately prove to be the most accurate scheme for classification.

EPIDEMIOLOGY

Exposure to Potentially Traumatic Experiences

When PTSD was originally incorporated into the diagnostic nomenclature (APA, 1980), exposure to traumatic events was thought to be unusual and rare. Recent studies of exposure have seriously challenged this assumption. In the National Comorbidity Survey (NCS), the first truly representative study of mental health problems among adults in the United States, Kessler and his colleagues (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995) learned that 61% of men and 51% of women reported at least one event that could potentially lead to PTSD. Importantly, the majority of people who reported one traumatic event had actually been exposed to multiple events of a potentially traumatic nature. Studies by other researchers have confirmed these high rates of exposure in contemporary U.S. society (Kilpatrick, Edmonds, & Seymour, 1992; Norris, 1992).

What types of events are most likely to lead to PTSD? In the NCS, a series of 12 questions posed to study participants elucidated the individual's history of exposure to potentially traumatic events. The events included combat, life-threatening accidents, natural disasters, witnessing injury or death, rape, sexual molestation, physical assault, child abuse, neglect, kidnapping or other forms of violent life threat, and other forms of severe stressors. The results varied to some extent by gender, with men indicating that rape, combat, and child abuse most often led to PTSD, whereas for women the events most likely to lead to PTSD were: rape, child abuse, molestation, and physical assault. Clearly, exposure to traumatic events is more common than anyone ever suspected.

PTSD Prevalence

Studies on the prevalence of PTSD have appeared in the research literature with increasing frequency since the publication of the DSM-III. These studies, often focusing on the prevalence of PTSD in the general U.S. population (Breslau, Davis, Andreski, & Peterson, 1991; Kessler et al., 1995), have also examined the rate of this disorder following combat (e.g., Kulka et al., 1988), among survivors of a natural disaster (e.g., Mount St. Helens; Shore et al., 1986), among those who have experienced criminal victimization (e.g., Kilpatrick et al., 1985; Resnick et al. 1993), among survivors of sexual assault and rape (Kilpatrick et al., 1992) and technological disasters (e.g., Buffalo Creek; Gleser et al., 1981). In each study, persistent mental health disturbances were found among some of the people who endured these extreme life experiences. In several of these studies, PTSD was measured directly by structured diagnostic interviews (e.g. Kilpatrick et al., 1992; Kulka et al., 1988), while in others only general disturbance and symptomatology were examined (Gleser et al., 1981). Unfortunately, rates varied substantially in many of the earliest studies, and it was difficult to compare the rates of PTSD across studies because of the utilization of different measurement instruments, sampling procedures, and methodologies. Indeed, the procedures for case identification used in many of the initial epidemiological studies suffered from a wide variety of methodological shortcomings. These may account for the differences in prevalence rates found

for PTSD in early studies. Yet, there has been a remarkable consistency in the findings regarding incidence and prevalence of PTSD since the development and use of standardized, reliable, and valid measurement tools.

General Population Estimates

The best estimates of the prevalence of PTSD in the general population of America come from two studies conducted in the early 1990s. Breslau et al. (1991) reported that 39% of a sample of young adults had been exposed to one or more traumatic events and that fully 25% of them developed PTSD as a result. This suggested a 9% rate of PTSD in the United States.

Similarly, the NCS, which reported much higher rates of exposure than the Breslau study (50%–61% vs. 39%), found a prevalence rate of 8% for PTSD. These estimates translate into approximately 20 to 25 million cases of PTSD across the United States alone. These estimates place PTSD among the most prevalent of all mental disorders, ranking below only substance abuse, social phobia, and depression.

Others have found different rates of PTSD in their studies. Helzer et al. (1987) found that one to two percent of the general population suffered from PTSD. In this study, a component of the Epidemiological Catchment Area study, PTSD was measured using the Diagnostic Interview Schedule (DIS) constructed by Robins and her colleagues (Robins et al., 1981). However, relying on a single diagnostic instrument to confirm psychiatric diagnoses and the employment of a regionally specific (St. Louis) sample for this study renders the results somewhat less convincing than those of the NCS.

Rates Following Specific Events

The most methodologically rigorous epidemiological study of PTSD ever conducted in the United States was the National Vietnam Veterans Readjustment Study (NVVRS; Kulka et al., 1988). These researchers, employing the multimethod approach to case identification initially proposed by Dohrenwend and Shrout (1981), selected a two-stage case identification process. From interviews conducted by trained lay interviewers, they identified high-risk individuals who were then interviewed by an experienced mental health clinician to verify diagnosis. To ascertain cases, these authors used multiple mea-

sures of PTSD—standardized interviews and psychological tests—which determined the probability of any individual having the PTSD diagnosis. Given the lack of a gold standard and the acknowledged problems in measuring any psychological construct, this multimethod approach was sound and continues to influence the conduct of epidemiological studies in mental health.

At the time it was conducted, the NVVRS was unique for at least two separate reasons: because it was the first time that any country sought to understand the psychological and social consequences of participation in a war, and because it employed a nationally representative sampling procedure. This sampling methodology is routinely employed in other medical areas but had never been applied in the mental health arena largely because of the complex logistics of such an attempt and the costs of conducting the interviews on a nationwide sample.

The NVVRS found that the current prevalence rate for PTSD among Vietnam veterans was 15%. Having oversampled several minority groups, this study was also able to report differential effects of the war on these groups. Among African Americans, 21% had PTSD; among Hispanics 28% had PTSD. Nearly 9% of female veterans (of whom there were some 7,000 who served in the Vietnam theater) also had current PTSD. Lifetime rates were essentially twice the current rate for both males and females. These findings indicated that a substantial number of the 3.14 million American men and women who served in the Vietnam War suffered PTSD at some point since their return from the war.

This study also suggested that rates of PTSD differed by service and gender variables. Specifically, the 15% rate of PTSD found in theater veterans is contrasted with a 4% rate in Vietnam-era veterans (those who did not go to Vietnam but did serve in the military). Among the female veterans, the 9% rate of PTSD is contrasted with approximately 2% of Vietnam-era female veterans.

In examining prevalence rates, it was determined that those who were exposed to high war-zone stressors had a current rate of PTSD of 36%, compared to those exposed to low/moderate war zone stressors, whose rate of PTSD was 9%. These findings indicated that those individuals who were involved in the most gruesome aspects of the war were the most

likely to develop significant and persistent psychological problems as a function of that experience. Clearly, the findings of this well-designed study indicated that the psychological effects of participation in the Vietnam War were long lasting for a very large number of its combatants.

PTSD can also occur following other life-threatening and stressful experiences. Resnick et al. (1993) employed a national sample of women and studied exposure to criminal victimization and its psychological consequences. They found that lifetime exposure to any traumatic event was 69%, with 12% of the total population of women developing PTSD at some point afterwards. Similarly, in the National Women's Study, Kilpatrick et al. (1992) found that fully 13% of U.S. women had been the target of a completed rape at some point in their life, with 31% of these women subsequently developing PTSD, yielding a national rate of 4% of U.S. women experiencing rape-related PTSD.

Following the eruption of the Mount St. Helen's volcano, Shore et al. (1986) examined the presence of postdisaster psychological disorders in three groups stratified by stress exposure. Among those exposed to the highest levels of stress, 40% reported major psychological disturbance for 3 to 4 years after the disaster. Similarly, McFarlane (1986) followed firefighters who were involved in extinguishing the Ash Wednesday bushfires in Australia and found that 21% of these people had PTSD symptoms 29 months after the event; little change had occurred longitudinally in these symptoms over this period.

The aftermath of the Beverly Hills Supper Club Fire in Kentucky was examined by Green and her colleagues (1983) in an elegant sequence of studies. They found high rates of psychological morbidity and established important conceptual links among preexisting traits, components of the stressor, and the posttrauma environment in identifying people who were at greatest risk of long-term impairment. This study served as an important model for future investigation of factors responsible for the development of PTSD.

In summarizing the epidemiology of PTSD, two things are eminently clear: first, the rates of exposure to potentially traumatic events is nothing short of epidemic in U.S. society. Seven out of 10 people have been exposed to at least one such event. Second, the

rates of PTSD place it among the most common of all mental disorders. With rates of rape, criminal victimization, natural disaster, technological disaster, and war all continuing unabated, public policy must place a high priority on improving access to care for affected citizens and on providing sufficient resources to enhance our scientific understanding of this disorder and its treatment. In any case, with war, disaster, and victimization all reaching startling proportions worldwide, it is clear that PTSD is a major international public health concern.

ETIOLOGY OF PTSD

Conceptual Models

There are at least three general models of PTSD that rely on psychological processes and concepts. The three approaches can be characterized by their use of psychoanalytic (e.g., Horowitz, 1977), behavioral (e.g., Keane, Zimering, & Caddell, 1985), or information-processing formulations (e.g., Chemtob et al., 1988; Foa, Steketee, & Rothbaum, 1989). Although they are derived from independent theories, the models are somewhat compatible with one another in the sense that they focus on and explicate different components of the disorder. To the degree that each approach has been able to generate distinct, testable hypotheses for investigation, each has contributed to our understanding of the disorder.

Psychodynamic Model

Although there is no single psychodynamic model for PTSD, an influential view is that of Horowitz (1976) who proposed that trauma occurs when an external event exceeds the ego's ability to tolerate the negative emotion associated with it. According to Horowitz, traumatic experiences produce "information overload" that must be processed psychologically in order to attain emotional equilibrium and behavioral adjustment. The individuals' personal schema, their beliefs and attitudes about themselves (i.e., self-concept) and the world around them, somehow must be altered to incorporate the occurrence of the extreme event and its meaning for them (see Janoff-Bulman, 1992).

Horowitz (1973) views PTSD as a disorder characterized by stages of undercontrol and overcontrol.

That is, periods of intrusive repetition of the traumatic event (i.e., flashbacks, nightmares, ruminative thinking) are seen as a consequence of undercontrol. Correspondingly, phases of denial and numbing are the products of defensive overcontrol. These stages can alternate with each other or, at times, can coexist. Thus, someone with PTSD might have intrusive memories of parts of the event (reflecting undercontrol), be emotionally constricted and numb toward other people in his or her life, and be unable to recall specific details of the most intense aspects of the memory (reflecting overcontrol).

Behavioral Model

Two-factor learning theory (Mowrer, 1960) has served as a useful animal model for many of the components of PTSD. This theory proposes that fear is learned via classical conditioning as the first stage of a process that can sustain emotional learning despite the impact of naturally occurring processes that would otherwise reduce it. The key is a second stage marked by avoidance behavior that minimizes the duration of contact with conditioned cues alone (i.e., without painful consequences) and thereby retards the extinction of the learned fear. Extending this framework to humans, Keane, Zimering, and Caddell (1985) proposed that an extreme stressor acts as an unconditioned stimulus (UCS) that is capable of producing learned associations with internal and external cues (visual, auditory, olfactory, and tactile) that are present when the stressor occurs. After such conditioned associations are established, previously neutral cues can evoke strong autonomic and physiological responses that resemble those that occurred at the time of the stressful event. These responses are so aversive that individuals may begin to systematically avoid the triggering cues as a way to limit their own fear. Thus, the impact of classical conditioning is considered especially important for the development of PTSD, and instrumental avoidance is viewed as critical to its maintenance (i.e., the two factors).

Cognitive or Information-Processing Model

Several prominent features of PTSD reflect attentional, perceptual, and memory processes (nightmares, intrusive thoughts, hypervigilance, concentration problems, and psychogenic amnesia). For this reason, the application of information-processing models of

psychopathology (Lang, 1977, 1979) has been a welcome addition to the PTSD literature (e.g., Foa et al., 1989). This set of theories proposes highly organized, semantic "fear networks" containing stimulus propositions (i.e., representations of cues that evoke fear), response propositions (i.e., representations of physiological, cognitive, and behavioral responses), and meaning propositions attached to both the stimulus and response components. Trauma networks are postulated by Foa et al. (1989) to have unusually stable and coherent stimulus, response, and meaning components. Accordingly, trauma networks may be fully activated by less intense input than other propositional networks because of the increased likelihood that many elements in the network will be active at the same time.

Similarly, Chemtob et al. (1988) proposed that representations of danger, fear, and threat (especially among those who have been exposed to life-and-death experiences) are stored in a rich, multidimensional semantic framework so that a wide variety of cues can activate the network easily. They extended the information-processing approach by hypothesizing that trauma memory networks in people who have PTSD are so well organized that, when activated, they can affect behavior, attention, and arousal in a feedback cycle that promotes severe symptomatic responses.

These information-processing models of PTSD prompt important questions regarding cognitive processes in PTSD patients. For example, do PTSD patients perceive their environments differently than others do? Do they interpret ambiguous stimuli as inherently threatening? Is their physiological reactivity more easily triggered by environmental cues than it is for others? Are they particularly attentive to stimuli that are threatening—even mildly so? These questions, among others, frame some of the current issues of interest to trauma investigators and provide a useful template for research on this disorder.

Neurobiological Models

There is no single neurobiological model for PTSD. Many research teams have investigated single physiological systems in an effort to define the neurobiological basis and correlates of PTSD. In the last 10 years there has been excellent progress in this area. From the beginning, PTSD was viewed by most au-

thorities as a stress response sharing many biological characteristics with responses to lower magnitude stressors. Recent research has challenged that assumption suggesting that the overwhelming nature of exposure to a life-threatening stressor can lead, in some people, to marked physiological changes that differ in fundamental ways from the normal stress response (Yehuda, Giller, Levengood, Southwick, & Siever, 1995). One of the most consistent findings in the psychobiological research on PTSD is the unexpected observation that individuals with PTSD frequently display alterations in the hypothalamic-pituitary-adrenocorticotrophic (HPA) axis marked by lower levels of cortisol; one of the main by-products of the production of catecholamines during the stress response. This finding is a consistent one across several forms of PTSD and is surprising because most authorities predicted elevations in this hormonal system. The implications of this finding are now being investigated and may yield compelling new information for understanding the biological basis of trauma.

Further, several studies have preliminarily demonstrated that individuals with PTSD may have a smaller hippocampus, an area of the brain central to the processing and relaying of information, the formation and retrieval of memory, and the promotion of contextual learning. Coupled with some fascinating infrahuman findings on the role of stress in the dysregulation of the HPA and in the morphology of the hippocampus, scholars are now beginning to propose a coherent psychobiological theory of the development and maintenance of PTSD. Although the precise changes and mechanisms are imperfectly understood at this time, researchers are building a sound evidentiary base for PTSD that involves the HPA axis, catecholamines, receptor sites, neurotransmitter systems, and specific brain regions that might account for the development of PTSD (Yehuda & McFarlane, 1997).

It is clear that stress alters a wide range of neurobiological systems down to the cellular level of functioning. It is also becoming increasingly clear that prior stress exposure alters the body's response to subsequent stressors, so that an individual who has experienced child abuse does not respond in the same way psychobiologically to a rape as does a rape victim without such a background (Resnick, Yehuda,

Pitman, & Foy, 1995). These findings may account for the epidemiological data suggesting that people with PTSD often have experienced multiple traumatic events (Kessler et al., 1995). There may be a sensitization that occurs following exposure to an overwhelming event that alters biological functioning and that places one at increased risk for developing PTSD when exposed to another traumatic event.

At the present time, many of the details of these dynamic biological processes are being elucidated by researchers (e.g., McEwen & Magarinos, 1997), and psychobiological models and theories for explaining the etiology of PTSD are in the nascent stage of development. At present, the task is to understand further the psychobiological underpinnings and correlates of PTSD so that cogent theoretical models and mechanisms can be proposed to help us understand why some people develop PTSD when exposed to overwhelming stressors and others do not (Yehuda & McFarlane, 1995). Ultimately, a comprehensive biopsychosocial theory that emphasizes person or constitutional variables (biological, cognitive, and personality factors), the characteristics of the event itself, and the postevent environment will account for the most variance in predicting outcomes.

Individual Differences in Risk or Vulnerability, Coping, and Social Support

As noted at the beginning of this chapter, etiological factors are a component of the diagnostic criteria for PTSD (i.e., the traumatic event: criterion A). It has been assumed that the magnitude of acute traumatic response and chronic symptom severity is a direct function of the frequency, intensity, and duration of the traumatic event, with the most extreme events yielding the most disabling symptoms for most people. In broad terms, this relationship is substantiated by available data; yet other factors are needed to account for the development of PTSD.

The most compelling evidence that other factors are involved in the development of PTSD is the frequent observation that only a proportion of the people exposed to a particular traumatic experience develop PTSD. Moreover, some people develop PTSD symptoms to events that appear to be low-level stressors. Person factors—that is, individual differences

in life history, personality, biological constitution, and behavior—are often introduced to explain these discrepancies.

Freud, Ferenczi, Simmel, and Jones (1921) proposed that soldiers whose psychosexual development was marked by unresolved conflicts were likely to develop war neuroses. A more physiological substrate of vulnerability for such dysfunction was reflected by the World War I term *shell shock* and the World War II term *combat fatigue*. More recent conceptualizations of psychopathology have emphasized diathesis–stress models (Zubin & Spring, 1977) which posit a chronic vulnerability combined with acute stress to produce mental and behavioral disorders. Barlow (1988), for example, has proposed that vulnerability can be genetic, physiological, psychological, social, or even a combination of these factors. A similar, biopsychosocial model of vulnerability has been applied to the etiology of PTSD (Foy, Carroll, & Donahoe, 1987; Keane, 1989).

Most recent work on the etiology of PTSD has occurred with Vietnam veterans. Egendorf et al. (1981) found that combat exposure was the strongest predictor of postmilitary adjustment, although minority status and poor family stability both accounted for significant variance. In a clinical sample of veterans, Foy, Sippelle, Rueger, and Carroll (1984) found that combat exposure variables accounted for significantly more variance than did a host of premilitary variables in predicting current PTSD symptomatology. Similarly, Penk et al. (1981) identified combat exposure as more important than demographic, family environment, or other premilitary variables among help-seeking substance-abusing veterans. In a group of officer candidate school graduates, Frye and Stockton (1982) again identified military variables and post-Vietnam experiences as more important than premilitary variables in the development of PTSD.

As mentioned earlier, the NVVRS found that war-zone stress exposure was a strong predictor of psychological adjustment in general and PTSD in particular. Subsequent analyses of these data employing structural equation modeling (a contemporary multivariate statistical procedure) suggested that components of the war experience were deeply associated with who did and who didn't develop PTSD (King, King, Gudanowski, & Vreven, 1995). Traditional combat experiences coupled with exposure to

atrocities or abusive violence, perception of a threat to life, and the harsh, malevolent environment of Vietnam accounted for much of the outcome observed in these veterans 20 years after their service. The availability of high levels of social support upon return home buffered the effects of the war, while the occurrence of additional traumatic events contributed to deleterious outcomes (King, King, Fairbank, Keane, & Adams, 1998).

Taken together, these results indicate the role of individual differences as important risk factors for the development of PTSD. They also point to the difficulty in retrospectively attributing current-day functioning to a single traumatic event, given that multiple traumatic events can occur to a single individual over the course of a lifetime. Conceptually, it is not surprising that people who are already exhibiting psychological distress will be at greater risk for PTSD once exposed to an extreme life event. Similarly, it is not at all surprising that, in aggregate, people who experience multiple traumatic events will have more adverse psychosocial outcomes.

Whereas the Vietnam veteran research literature has provided critical data in understanding the linkage between the stressor and symptomatology, it is not the only empirical data confirming this relationship. Shore, Tatum, and Vollmer's (1986) evaluation of the Mount St. Helen's explosion indicated that those subjects who were exposed to the greatest amount of destruction and devastation reported the most psychological distress, both in the short term and over the next several years. In confirming the relationship of disasters to PTSD, Rubonis and Bickman (1991) employed a meta-analytic strategy and found a distinct relationship between the extent of various disasters and the subsequent negative effects on the long-term mental health of survivors.

Although many variables contribute to the ultimate development of PTSD, it appears reasonable to conclude that the dominant contributor to the development of PTSD is the traumatic stressor. Person factors such as biological, psychological, and social variables also play a role, but the exact mechanism of this role is not fully understood at this time (e.g., Yehuda & McFarlane, 1995). Future studies might also examine pretrauma, trauma, and posttrauma factors in a systematic way so that the relative contributions of each can be more precisely understood.

Many studies have found that the most vulnerable and disenfranchised people suffer disproportionately as a function of exposure to extreme events. However, this does not imply that individuals who have greater resources, a different biological constitution, or disproportionate levels of power are not vulnerable to the negative effects of such life experiences. Once exposed to extreme events, all are at risk for the development of psychological distress. For each individual it is simply a matter of how extreme the event (or series of events) is before he or she will begin to suffer a traumatic response. However, certain segments of our population clearly are at greater risk for exposure to extreme events and thus for the development of persistent adverse psychological reactions.

Many studies have demonstrated that minority-group members and women are at greater risk for the development of PTSD (see, e.g., the NVVRS). Future research studies might address the factors responsible for placing these individuals at higher risk for PTSD. Issues to be examined would include differential levels of vulnerability, both biologically and psychologically, as well as cultural, educational, and socioeconomic factors.

Coping and Social Support

The psychological condition of individuals appears to be enhanced or impaired as a result of the coping strategies employed and the social support systems available. For this reason, Fairbank, Hansen, and Fitterling (1991) examined the coping style of former prisoners of war with and without PTSD. They learned that the coping styles of both groups were similar for standard everyday stressors, but that when traumatic memories were considered, the PTSD ex-prisoners of war displayed unique characteristics. They used more self-isolation, wishful thinking, self-blame, and social support in an effort to cope with the traumatic memories.

Many theoreticians have offered a stress-buffering hypothesis to explain the positive effects of strong social support systems (Cobb, 1976; Rabkin & Struening, 1976). Keane, Scott, Chavoya, Lamparski, and Fairbank (1985) explored changes in social support systems among patients with PTSD through a period of some 15 years beginning immediately prior to trauma. On all dimensions of social support (including sources of material support, advice, physical sup-

port, financial support, and positive social interactions), the PTSD groups showed a decline from pre-trauma to posttrauma and onward to the time of the current assessment. This reported decline in the dimensions of social support was mirrored in measures of social support network size and of individuals' levels of satisfaction with their support systems.

It appears that individuals with PTSD suffer a wide range of psychological symptoms that are accompanied by dramatic reductions in social support over time. This decline in support may place them at continued risk for an exacerbation of distress when they encounter new life stressors. In addition, one might hypothesize from these data that those individuals who maintained and used their social support systems would be the most likely ones to recover from PTSD during the time following a traumatic experience. For whatever reasons, those unable to use their support systems or those who lack support systems continue to be symptomatic.

Information Processing in PTSD

As mentioned earlier, many current studies of information processing stem from the cognitive network conceptualization of anxiety developed by Lang (1977, 1979). This model hypothesizes that the cognitive representation of fear involves stimulus and response propositions that relate to the fear-eliciting cues, on one hand, and the motoric and physiological reactions they elicit on the other, as well as meaning propositions that contain personally relevant information. Cognition, motoric behavior, and physiology are response channels that can represent activation of the fear network.

Studies by McNally and his colleagues (McNally et al., 1987; McNally, Kaspi, Riemann, & Zeitlin, 1990) have elucidated some of the cognitive mechanisms associated with PTSD. In an initial study, PTSD veterans were compared with non-PTSD combat veteran psychiatric patients and with noncombat psychiatric veteran controls on a learning and memory task containing fear-relevant and control words. Although all three groups were equally sensitive to the detection of threat-related words, only the PTSD group demonstrated any emotional processing (e.g., increased skin conductance) as a function of the presentation of the combat threat words. This study provided additional support for the emotional reactivity

of PTSD patients when fear-relevant stimuli were presented to them. Moreover, it demonstrated that simple semantic presentations were capable of activating the trauma or fear network (compared to studies using more intense nonsemantic cues).

In a second sequence of studies, this research group employed the Stroop interference task (Stroop, 1935), wherein words of varying levels of threat are presented in different colors. The experimental task is to identify the color of each word as quickly as possible. Selective processing of information is reflected by relative response latency for color naming as well as response accuracy per se. Longer latency and poorer accuracy in color naming are presumed to represent interference with information processing. Consistent with the author's hypotheses, combat veterans and rape victims with PTSD took significantly longer to color-name the PTSD-threat words than the control words. In addition, PTSD subjects were distinguished from an array of control groups (e.g., rape victims without PTSD) in their performance on this task. These findings are consistent with the notion that PTSD patients have cognitive representations of their traumatic experiences that can influence their interpretation of stimuli and events in their lives (Litz & Keane, 1989).

Research on attentional and memory processes in PTSD has also yielded valuable information about the disorder. Zimering, Caddell, Fairbank, and Keane (1993) found that, compared to well-adjusted combatants, PTSD patients showed attentional deficits on continuous performance tasks and poorer performance on affect recognition tasks (auditory). These findings were coupled with intact immediate memory for two verbally presented paragraphs (the Wechsler Memory Scale). These preliminary findings further demonstrate the selective nature of cognitive defects associated with PTSD.

Studies of information processing seem to hold great promise for understanding the nature of this disorder and for assisting in identifying the underlying cognitive and emotional components of PTSD. With increased research attention, information processing will provide a more complete functional analysis of the disorder and will more accurately describe the perceptual, emotional, and cognitive features of PTSD. These features may become targets for the development of assessment techniques (i.e., psychological markers) or treatment interventions.

COURSE AND COMPLICATIONS OF PTSD: LONGITUDINAL FINDINGS

Most PTSD research consists of cross-sectional studies that examine symptoms of the disorder at a single point in time following exposure to a traumatic event. To date, no long-term, prospective studies have been designed for the explicit purpose of examining fluctuations of symptom intensity and frequency across time in PTSD patients. Nonetheless, several retrospective studies do provide useful information on the course and duration of PTSD.

Retrospective studies that assessed individuals long after exposure to a traumatic stressor have documented the presence of PTSD over periods of 14 years (Green, Lindy, Grace, & Leonard, 1992) and 17 years (Desivilya, Gal, & Ayalon, 1996). The NVVRS evaluated PTSD symptomatology retrospectively by asking subjects about both lifetime and current occurrences of the disorder. They found that 30% of Vietnam veterans had PTSD at some point since military discharge, with 15% of the total sample reporting current PTSD. This 50% reduction over time was true for both male and female veterans over a period of approximately 15 to 20 years.

Several prospective studies have evaluated individuals at limited intervals following a traumatic experience and offer information about the short-term course of PTSD. Rothbaum, Foa, Riggs, Murdock, and Walsh (1992) assessed women for PTSD symptoms over 12 consecutive weeks following a sexual assault. At the time of the initial assessment, 94% of the women met criteria for PTSD. Three weeks later, 65% of the women endorsed PTSD symptoms, and by the 3-month evaluation, the number of women with PTSD had dropped to 47%. In a similar study of individuals who experienced nonsexual assault, Riggs, Rothbaum, and Foa (1995) examined PTSD symptoms weekly for 3 months and again found a sharp decline in PTSD symptomatology between the 1-month evaluation at which PTSD status was first established and the 3-month evaluation.

Prospective research that extends the assessment time frame beyond 3 months is found in a series of studies by McFarlane, who assessed PTSD symptomatology in 469 firefighters who were involved in the 1983 Australian bushfires. McFarlane (1986) found that PTSD was still evident in 41 cases and had

resolved in 59 cases at a point 11 months after the fires. At the 29-month follow-up, PTSD had emerged in another 52 cases and resolved in 35. Only 53% of those who were diagnosed with PTSD at the 4-month evaluation met full diagnostic criteria at the 29-month evaluation. At 42 months, only a subgroup of 147 subjects (from the original 469) who had characteristics that placed them at high risk for PTSD were interviewed again. A total of 70 subjects were found to have PTSD (Spurrell & McFarlane, 1993). On the basis of this evidence, McFarlane concluded that PTSD as a result of a natural disaster can have a chronic course for some and a recurrent course for others, and that delays in the onset of the disorder are not uncommon. At the symptom level, McFarlane (1988) also noted that the reliving symptoms dissipated over time for many individuals, whereas the numbing and arousal symptoms seemed to be more persistent.

Additional information regarding the course of PTSD comes from studies of Israeli war veterans. Solomon (1988) followed soldiers who developed acute combat stress reactions during the 1983 Lebanon War. At the 2-year follow-up, 56% of the combatants who had an acute reaction also met criteria for PTSD, whereas only 18% of the nonreacting controls had developed PTSD. Those with PTSD suffered significant marital, social, and vocational impairment. Most individuals in this sample who developed PTSD met all symptom criteria for the disorder at the time of their acute reaction.

Finally, a prospective longitudinal study by Ronis et al. (1996) examined mental health service utilization by patients with PTSD in Veterans Health Administration (VHA) inpatient and outpatient facilities over a 56-month period. Their analysis was based on the assumption that the pattern of utilization reflects the course of the disorder. They found that PTSD patients used substantial amounts of mental health services and that their utilization was both persistent and episodic. On the basis of these data, the authors concluded that PTSD remissions are typically followed by relapse and that the absence of symptoms does not mean the disorder has fully resolved. Current VHA mental health policy reflects a similar view in that it characterizes combat-related PTSD as a chronic mental condition that cannot be expected to show stable improvement without sustained intervention.

The course of PTSD appears to be variable in terms of onset, chronicity, and recurrence. However, it does appear that PTSD symptoms develop acutely in many individuals following a traumatic stressor and that this can become a chronic condition in a significant minority of affected individuals. Studies have shown that individuals who experience a chronic course of PTSD may be distinguished by greater traumatic experience (e.g., criminal victimization; Desivilya et al., 1996), a higher level of dissociation in response to the traumatic event (Bremner & Brett, 1997), more severe initial symptoms (Riggs et al., 1995), and a predisposing family history (Solomon, Kotler, & Mikulincer, 1989). PTSD symptoms also may be reactivated by the anniversary date of a traumatic event or other life stressors (e.g., death of a loved one, serious medical illness, retirement, etc.; Davidson & Fairbank, 1993). Future research that contains more comprehensive examinations of factors influencing the course of the disorder, such as type and severity of trauma, age at the time of traumatic exposure, gender, and ethnicity, will undoubtedly broaden our understanding of the longitudinal course of this complex disorder.

COMORBID CONDITIONS

Studies of PTSD in the clinical setting and in the community suggest that PTSD is associated with a number of other disorders. For example, Keane and his colleagues (Keane et al., 1983) found high rates of substance abuse, including alcohol and drug abuse, in a clinical sample of Vietnam veterans. Similarly, Sierles and his colleagues (1983, 1986) in both an inpatient and an outpatient medical setting found high rates of alcohol abuse, depression, and antisocial personality disorder in addition to the primary diagnosis of PTSD.

In addition, Keane and Wolfe (1990) examined comorbidity among 50 help-seeking PTSD veterans using the Structured Clinical Interview for DSM-III-R (Spitzer & Williams, 1985). This study indicated that 84% of the sample met criteria for substance abuse or dependence and that 68% met lifetime criteria for major depression, with 34% reaching criteria for dysthymic disorders. Further, 26% of the sample were diagnosed with an Axis II personality disorder, generally an antisocial personality disorder. These patients averaged 3.8 diagnoses, including PTSD.

In the NVVRS, Kulka et al. (1988) also found high rates of comorbidity among community-residing veterans. Using the DIS (Robins, Helzer, Groughan, & Ratcliff, 1981), they found that virtually all PTSD cases also met criteria for another disorder at some time in their lives and that 50% had another disorder within the past 6 months. Alcohol abuse or dependence (73%) was the most prevalent coexisting disorder, while antisocial personality disorder was found among 30% of the community sample. Depression (26%) and dysthymia (21%) were also frequently associated diagnoses.

These clinical and community studies have consistently found that PTSD is associated with high rates of comorbid substance abuse (particularly alcohol abuse), depression, and antisocial personality disorder. However, all studies reviewed here studied PTSD in veterans; thus, these findings may be specific to PTSD in that population.

Helzer et al. (1987) studied the general population in the St. Louis catchment area and also observed that individuals with PTSD were twice as likely to have another disorder as were individuals without PTSD. Depression, dysthymia, and obsessive-compulsive disorders were frequently seen in this sample. Moreover, Kilpatrick, Saunders, Veronen, Best, and Von (1987) used the DIS to examine the consequences of criminal victimization and also reported high rates of comorbidity. Sexual dysfunction (41%), major depression (32%), obsessive-compulsive disorder (27%), social phobia (18%), and agoraphobia (18%) were all found to be associated with PTSD.

Indeed, PTSD rarely occurs in isolation. Among women who have been raped and are seeking treatment, high rates of comorbidity are typically observed (Cashman, Foa, & Molnar, 1995; Griffin, Resick, & Mechanic, 1996). Major depression and substance abuse are the most frequently observed concurrent conditions in PTSD patients, and data from the National Comorbidity Study clearly indicate that PTSD often precedes the onset of depression and substance abuse (Kessler et al., 1995). The presence of this degree of comorbidity often contributes to the complexity involved in conducting research on PTSD as well as in its clinical assessment and treatment (Keane & Kaloupek, 1997).

Analyzing these high rates of comorbidity presents a challenge. Are these separate, independent

disorders? Are they secondary to PTSD? Do they predispose one to develop PTSD? Or are these findings a function of the limitation of our classification scheme or our measurement tools? Some authors have suggested that PTSD is characterized by diffuse symptomatology beyond the reliving, numbing, and hyperarousal criteria (Keane & Wolfe, 1990) and that the high rate of symptom endorsement is due in part to the distress felt by sufferers. Others have identified the symptom overlap between PTSD and other disorders as an artifact that produces this high rate of comorbidity. Future research on developmental histories, family genealogies, and genetics may help us disentangle the puzzle underlying the high rates of comorbidity in PTSD. At present there appears to be some evidence to suggest both that the presence of other psychological disorders is a risk factor for developing PTSD (Breslau et al., 1991) and that the development of PTSD leads inexorably to the development of other conditions such as substance abuse and depression (Kessler, et al., 1995).

IMPLICATIONS FOR TREATMENT OF PTSD

The psychological treatment of PTSD has advanced considerably since the development of reliable and valid assessment methods. Successful treatment of PTSD secondary to a wide variety of traumatic events typically includes anxiety management methods, such as stress inoculation, in addition to one or more of the exposure therapies, including systematic desensitization, flooding, graduated in vivo exposure, or implosive therapy (see Keane, 1997, for a full evaluation of the treatment outcome literature). Studies on combat veterans (Keane et al., 1989), rape victims (Foa, Rothbaum, Riggs, & Murdock, 1991; Resick & Schnicke, 1992), and civilian trauma (Brom, Kleber, & Defares, 1989) support the use of these methods.

Yet, the psychological treatment of PTSD can be complicated as a result of its chronic course, the high levels of comorbidity frequently observed, the development of character problems secondary to living under extreme duress for sustained periods of time, the presence of numerous psychosocial problems, and its resistance to a wide range of psychopharmacological interventions. Further information is needed about

the biological correlates of PTSD and the specific structural, hormonal, and neurotransmitter systems that suffer dysregulation as a function of exposure to life-threatening traumatic events and the development of PTSD. This will guide the development of additional, innovative treatments for the disorder.

As researchers head into the next millennium, the clear priority for research foci will be on the provision of treatment services in the most effective way, in the most accessible settings, and with an emphasis on combining treatments that have empirical documentation for positive treatment outcome, whether those treatments are psychological or psychopharmacological in nature. Increasingly, resources are being directed on a national, regional, and local level to the treatment of victims of violence and other forms of psychological trauma. This trend can be expected to continue indefinitely in response to the high rates of trauma exposure in contemporary society, the high prevalence of PTSD, and the tremendous social and economic costs associated with this disorder.

PTSD Case Description

Mr. J is a 26-year-old single white male referred by his psychiatrist for desensitization therapy of intrusive memories surrounding a traumatic event that occurred two years earlier. At the time he presented for therapy, the patient was experiencing intense PTSD symptoms secondary to a near fatal automobile accident.

Exposure to a traumatic event: *On his return home from work one evening, Mr. J stopped and then proceeded into a four-way stop intersection. In the middle of the intersection, his car was broadsided on the left by a speeding car. The force of the impact spun his car around twice and overturned the car. When his car stopped moving, Mr. J was crushed between the car door, the steering wheel, and the roof. He remained conscious and attempted to free himself from the wreckage, but pain from his legs and chest increased with each attempt. He felt his blood on his face and chest but could not specifically pinpoint his injuries. Moments later, in this trapped position, Mr. J heard a loud pressured hissing noise from the car's engine and was terrified that the engine would explode. Then, when the noise abated, Mr. J became filled with dread that he would bleed to death before he could be freed from the car. When he heard the siren of the ambulance, he felt relief and horror simultaneously because he feared he would lose a limb in order to be freed from the car. Mr. J was finally freed by the Jaws of Life 2 hours later and made a near-full medical recovery.*

Reexperiencing symptoms: *The patient's intrusive thoughts began immediately after the accident and persisted 2 years following the event. He had frequent nightmares of the accident (from which he would awake screaming), daily intrusive thoughts and images of his entrapment, kinesthetic flashbacks in which he could feel blood on his skin, and auditory flashbacks of the loud noise of the crash and the hissing sound of steam. He was particularly plagued by the physical and psychological feeling of being trapped and experienced this sensation in a wide array of settings where he was in small, enclosed spaces, including cars, elevators, and small rooms. Additionally, the sound of any siren resulted in an intense anxiety reaction.*

Avoidance of stimuli associated with the trauma: *Following his serious motor vehicle accident, Mr. J began to avoid driving or riding in an automobile. It was difficult for him to walk (because of a leg injury from the accident), and he avoided using public transportation because of the small enclosed space of a bus or subway. As a result, Mr. J severely curtailed his activities. He quit his job and greatly decreased his once active social life. Furthermore, it became increasingly uncomfortable for him to be in public because he could not predict when something in his environment (e.g., an ambulance siren) would trigger an intrusive thought of the accident and a significant anxiety reaction. Interpersonally, his commitment to his girlfriend and plans for marriage made him feel trapped (evoking images of the accident), and he ended their engagement. Thus, in order to avoid exposure to both internal and external cues of the accident, Mr. J isolated himself physically from the external environment and numbed his feelings emotionally.*

Symptoms of increased arousal: *Mr. J endorsed all symptoms of increased arousal. He was unable to sleep without medication and had difficulty concentrating on simple tasks. He had frequent outbursts of anger, and he harbored a rage toward drivers who did not obey all traffic laws. On one occasion, when he witnessed a driver make an incomplete stop at a flashing red light, he became incensed and threw a large rock at the car, shattering the rear window. On the rare occasions when Mr. J had to drive, his extreme levels of hypervigilance negatively affected his driving because he tried to be aware of everything in his environment and did not concentrate sufficiently on the road and other drivers. The patient frequently showed an exaggerated startle response to loud, sudden noises that closely resembled the auditory characteristics of the accident.*

Desensitization treatment for the traumatic reexperiencing symptoms was very effective and resolved distressing images and perceptions quickly. Unfortunately, Mr. J

continued to experience symptoms of avoidance and increased arousal, which were much more difficult to resolve. These required additional treatment that focused on stress management skills and cognitive strategies that promoted a change in his views of himself, the world, and his relationship with others, as well as an understanding of his avoidant behavior.

SUMMARY AND FUTURE DIRECTIONS

Although we have learned a great deal about the psychological effects associated with exposure to extreme stressors, much work remains to be done. Many of the studies that have been conducted on exposure to disasters, sexual abuse, and technological accidents indicate that psychological impairment can result as a function of these experiences. Unfortunately, many studies suffer from methodological weaknesses that preclude firm conclusions with respect to tying the psychological stress directly to the traumatic events. Future research in this area needs to continue to include randomly selected samples of subjects, appropriate comparison groups, and psychological test instruments that have documented reliability and validity. By improving the methodological quality of these studies, we will enable policymakers to develop comprehensive public policy toward victims and survivors so that justice is provided to all those affected by these experiences.

Psychophysiological arousal and reactivity have been documented among veterans with combat-related PTSD. Recent research has documented that individuals with PTSD from different events, such as moving vehicle accidents and terrorist attacks, also manifest this heightened psychophysiological pattern. In addition to the diagnostic importance of this arousal pattern, it is distinctly likely that this sustained, heightened cardiovascular reactivity places these individuals at substantial risk for the development of health-related problems including cardiovascular disease. Future research studies examining the association between PTSD and cardiovascular disease would, therefore, be both timely and important. Similarly, studies of stress, anger, and immune system functioning are also theoretically important to examine in this population. Theoretical models of health and disease would indicate that individuals with high levels of stress, depression, and anger are

at risk for the development of neoplastic disease as well as cardiovascular disease.

Much work needs to be done to understand more fully the gender differences in response to traumatic events. Currently, there is an opportunity to begin to examine more closely the psychological effects of war-zone stress exposure in men and women. The Persian Gulf War provided an experience where for the first time males and females served in many similar roles and were exposed to many of the same overwhelming stressors. As a result of this experience, we may be able to examine the extent to which gender influences the expression and manifestation of traumatic symptoms (Ursano & Norwood, 1996).

Further, there is some reason to believe that there may well be a genetic component that helps determine who does and who does not develop PTSD. Future work on this topic will help researchers to understand more fully the role of biological determinants and how they interact with developmental course and environmental events to yield symptoms of PTSD.

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